Spontaneous coronary artery dissection: value of beating heart myocardial revascularization

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Abstract

Spontaneous coronary artery dissection is a rare and generally fatal disease. It usually occurs in women during the post-partum period or women taking oral contraceptives. Treatment depends on the clinical presentation and the results of coronary angiography. Beating heart myocardial revascularization is particularly useful in this case, as it allows coronary artery bypass graft to be performed without manipulating the ascending aorta, thereby minimizing the risk of post-CPB aortic dissection, and without important modification of arterial pressure.

Keywords: Spontaneous coronary artery dissection; Beating heart myocardial revascularization

1. Introduction

Spontaneous dissection of coronary arteries is a rare disease whose etiologies and pathogenesis have not been fully elucidated. The most frequent outcome is sudden death, but some patients may present with clinical features of coronary insufficiency. When the diagnosis is established in time and surgical revascularization is proposed, the beating heart myocardial revascularization technique is particularly useful, as it avoids handling and cannulating the ascending aorta, thereby reducing the risk of aortic dissection.

We describe a case of spontaneous coronary artery dissection in a young woman who was treated by beating heart myocardial revascularization.

2. Case report

Mrs. R., 41 years old, presented to the emergency department with prolonged recurrent angina. Her family history included sudden death of her father at a young age, and a spontaneous carotid dissection of her uncle.

The ECG showed disorders of repolarization on the anterior leads and laboratory tests showed isolated elevation of troponin. Arterial duplex ultrasound demonstrated left renal artery dysplasia.

Coronary angiography (Fig. 1) showed a very large, clear endovascular image almost completely obstructing the left anterior descending artery with a double image suggesting localized spontaneous dissection and slight anterior hypokinesia with an ejection fraction of 68%. Treatment with Aggrastat (tirofiban), a platelet glycoprotein IIb/IIIa receptor antagonist, was administered for 48 h due to the presence of intravascular thrombus. Follow-up coronary angiography (Fig. 2) at the end of this period demonstrated persistence of the thrombus and delayed flow in the underlying LAD.

The patient was referred for surgical myocardial revascularization, consisting of beating heart single-vessel bypass graft of the internal mammary artery onto the proximal LAD. This operation was conducted under good hemodynamic conditions with a mechanical heart stabilizer (Guidant OPCAB™ System). Coronary perfusion was ensured by introduction of a 2.5-mm diameter intracoronary shunt (Flo thru® intraluminal shunt Bio vascular, Inc) via a 9-mm coronary arteriotomy. Anastomosis was performed with a 8/0 polypropylene running suture.
The postoperative course was uneventful.

Histological examination of a fragment of internal mammary artery revealed few elastic fibers and a media rich in muscle fibers, but disorganized and fibrous.

Examination of a skin biopsy showed excessively large and often fragmented elastic fibers in the deep and intermediate dermis.

3. Discussion

Spontaneous dissection of coronary arteries is rare. The majority of cases (70–75%) [1,2] are diagnosed post mortem, as the immediate mortality is 50% with a 20% mortality over the hours following the dissection [3]. It is rarely discovered on angiography, as it is observed on only 0.1% of coronary angiographies. The etiologies are poorly defined, but may include abnormalities of collagen synthesis [4]. It is more frequently observed in women, particularly during the post partum period or in women taking oral contraception [5], in whom it is responsible for one-third of all myocardial infarctions [6]. Coronary artery dissection generally results in sudden death [1], but some patients may present with features of coronary insufficiency, allowing the diagnosis by coronary angiography, demonstrating spontaneous coronary artery dissection.

The treatment of spontaneous dissection must be defined case by case as a function of the clinical signs and coronary angiography results. Medical treatment can be considered in asymptomatic patients [7]. Angioplasty with placement of an intracoronary stent can give good results, but is associated with a risk of progression of dissection or the formation of intramural hematoma [8]. Classical surgical myocardial revascularization under cardiopulmonary bypass has been reported in the literature to achieve good results [4,9,10] and is recommended as first-line treatment, especially when several coronary vessels are involved [6]. This type of surgery can restore blood flow distal to the dissection and may reinforce the false and true channel [4], but also presents a risk of dissection at the site of aortic cannulation [11] due to the fragility of the tissues related to the underlying disease. Beating heart myocardial revascularization techniques avoid high modification of arterial pressure and avoid any manipulation of the aorta and therefore minimizes the risk of aortic dissection, while allowing a complete coronary artery repair procedure and coronary artery bypass graft.

4. Conclusion

Beating heart myocardial revascularization may be a useful option for the treatment of spontaneous coronary dissection, as it provides all of the advantages of surgical repair, while avoiding manipulation of the ascending aorta that can be responsible for aortic dissection.

References


Appendix A. ICVTS on-line discussion

**Author:** Dr. Hitoshi Hirose, Juntendo University, Department of Cardiovascular Surgery, Hongo, Bunkyo-ku, 2300 Overlook Rd. #312, Tokyo, 44106, Japan

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**Message:** The authors presented a case of isolated left anterior descending artery (LAD) occlusion due to spontaneous dissection of the coronary artery. The Authors treated the patient initially with thrombolytic therapy, and later with off-pump coronary artery bypass graft (CABG) because of initial thrombolysis failure. Off-pump CABG was performed by the authors, however, the method of the approach, via midline sternotomy or via left mini-thoracotomy, was not described in this report.

If I were a cardiologist, I would perform percutaneous transluminal coronary angioplasty (PTCA) with direct stenting for this case, because the onset of the myocardial infarction was relatively fresh and because the other coronary vessels were intact. I would repeat coronary angiography 24 hours after PTCA and stenting to see if the stent stayed open or not. If it closed, I would then refer to surgeons who could perform minimally invasive direct coronary artery bypass (MIDCAB) via the left mini-thoracotomy incision. The reason for MIDCAB via the left mini-thoracotomy is as follows:

1. Single vessel lesion in the LAD has been best treated by bypass grafting with the left internal mammary artery.
2. Considering the patient’s age (41 years old), future development of atherosclerotic coronary artery disease is expected. Sternotomy can be saved for future multivessel revascularization.
3. The presented case has a good caliber size of the LAD to do off-pump anastomosis.

As a cardiac surgeon, the quality of the anastomosis by MIDCAB should be the same as on-pump CABG. Technical failure of MIDCAB usually results in redo CABG.